

DOCUMENT-IDENTIFIER: US 5579258 A
TITLE: Ferroelectric memory

ABPL:

A nondestructive readout ferroelectric memory device for writing/reading information by reversing/not reversing a ferroelectric polarization state, and a method for manufacturing the same includes a ferroelectric memory cell array having ferroelectric memory cells arrayed in matrix and each having a nonlinear resistor of $\text{ZnO/Bi}_{0.2}\text{O}_{0.3}/\text{ZnO}$, a ferroelectric substance, and an intermediate electrode of Pt interposed therebetween, and upper and lower electrodes intersecting each other and interposing the ferroelectric memory cells, or a ferroelectric memory cell array having ferroelectric memory cells arrayed in matrix and each having a nonlinear resistor both surfaces of which are covered with high-melting point metal and which is formed of a varistor thin film of $(\text{Sr}_{1-X}\text{Ca}_X)\text{TiO}_3 + \text{MeO}$ formed by thermal treatment of metal alkoxide compound mixing liquid (precursor), a ferroelectric thin film of $\text{Pb}(\text{Zr} \cdot \text{Ti})\text{O}_3$, and an intermediate electrode of Pt interposed therebetween, and upper and lower electrodes intersecting each other and interposing the ferroelectric memory cells. The above ferroelectric memory cell array includes x and Y decoders for selecting a desired ferroelectric memory cell and a voltage generator for applying a predetermined voltage only to a nonlinear resistor of the selected ferroelectric memory cell.

BSPR:

In general, a ferroelectric substance for forming a ferroelectric thin film has a great piezoelectric effect, pyroelectric effect, electrooptic effect, acoustooptic effect, and nonlinear optic effect and is used for a nonvolatile

memory, a sensor, a transducer, an actuator, an active optical element, a communication element, and the like.

DEPR:

A ferroelectric memory device having a multilayer structure, as shown in FIG.

4A, is formed through the above process.

DEPR:

The ferroelectric memory device according to the third embodiment formed by the above manufacturing process, has an advantage in that a difference in level is small between the interlayer insulation film and the memory cells to reliably separate the memory cells.

DEPR:

In the ferroelectric memory device according to the first to third embodiments, the nonlinear resistance layer is formed on the ferroelectric thin film to form a ferroelectric memory cell array having a simple matrix structure. Thus, when the nonlinear resistance layer has a high resistance, that is, when it is turned off, the capacitance of the ferroelectric thin film is reduced, and there is no crosstalk among the memory cells. Furthermore, the ferroelectric thin film has a small linear capacitance by virtue of a write/read operation, and the recording state of the nonselective memory cells is not destroyed.

DEPR:

FIGS. 9A to 9F show a structure of a ferroelectric memory device according to a fourth embodiment of the present invention and a process of manufacturing the same.